

# Top performance for cloud computing



Samsung ingenuity delivers ultimate cloud computing performance and reliability



SAMSUNG

Samsung  
MEMORY

activated

# Successfully Riding the Flash Wave

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# What You Are Going to Hear from Me Now



Who We Are & What We Do



NAND Flash Technology Update



Samsung SSD Portfolio for NAS Solutions

*...and a brief introduction of your presenter:*

*Dieter Graf*

*Samsung Semiconductor Europe GmbH*

*Office: Munich*

*Responsible for Sales throughout EEU / AUT / Switzerland*



## ELECTRONICS

Electronics  
SDI  
Electro-Mechanics  
SDS  
Display



## FINANCIAL SERVICES

Life Insurance  
Fire & Marine Insurance  
Card  
Securities  
Asset Management  
Venture Investment



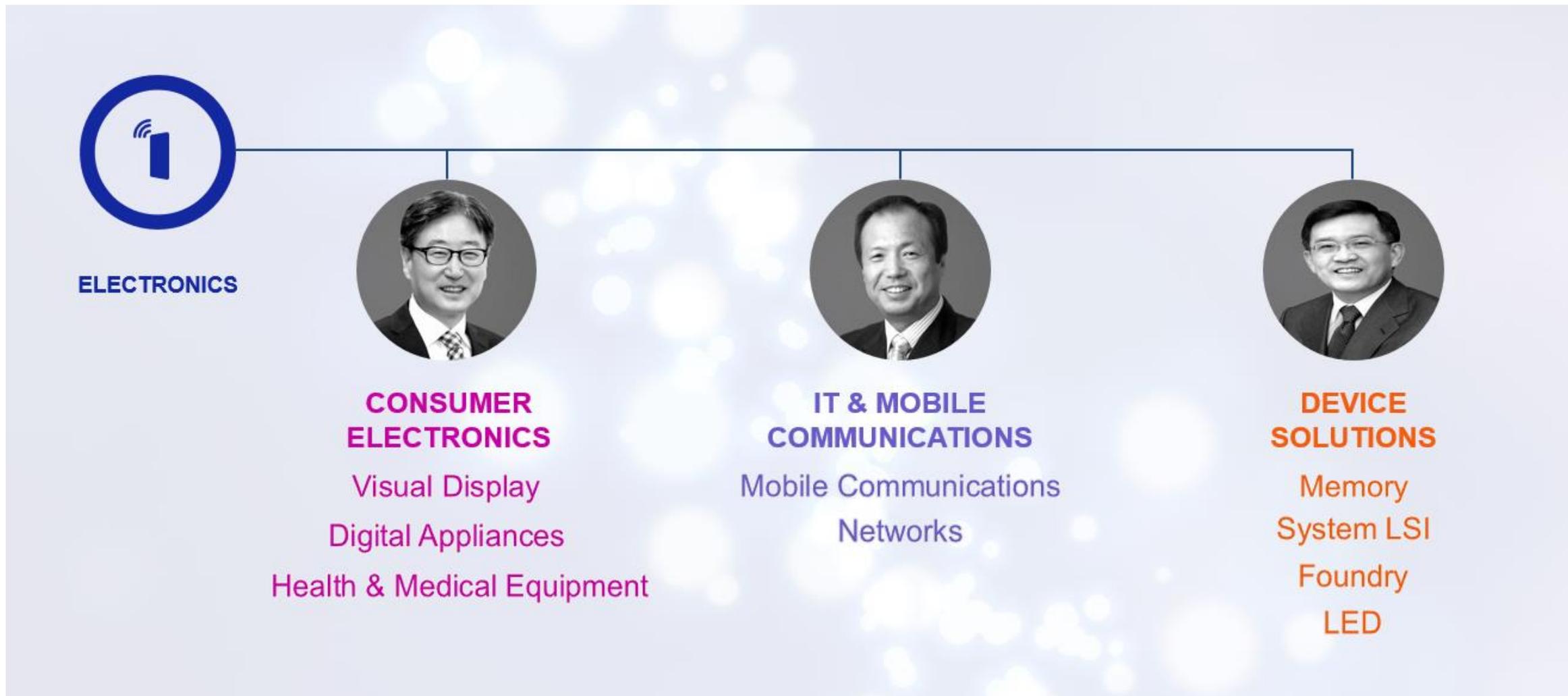
## MACHINERY & HEAVY INDUSTRIES

C&T (Construction)  
Heavy Industries  
Engineering



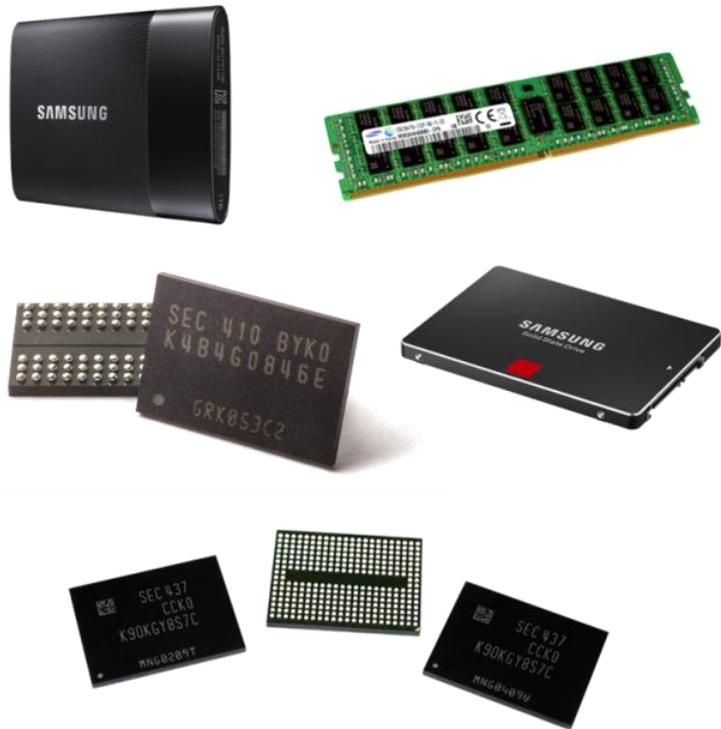
## TRADE & SERVICES

C&T (Trading)  
Hotel Shilla  
Cheil Worldwide  
S-1 Corporation  
Medical Center  
Biologics  
Bloepis

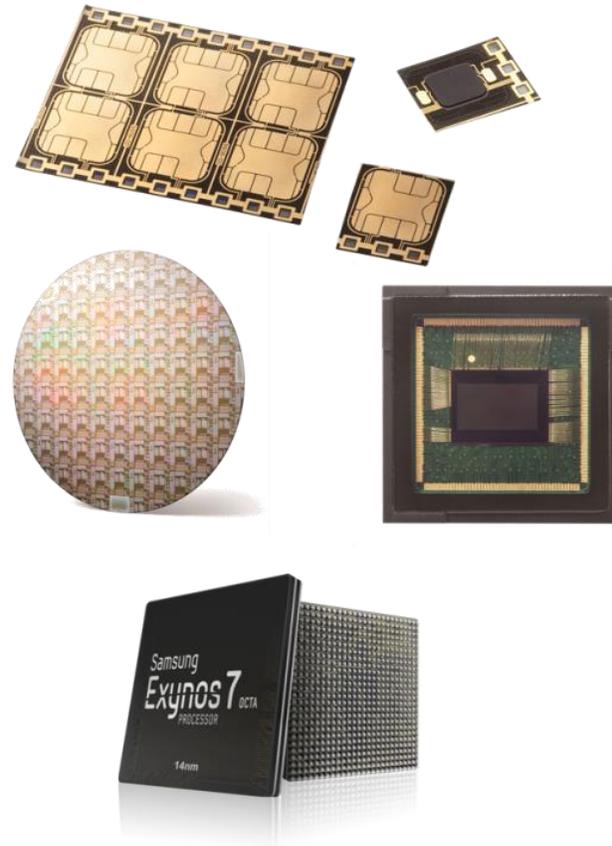


## Device Solutions

### Memory



### System LSI

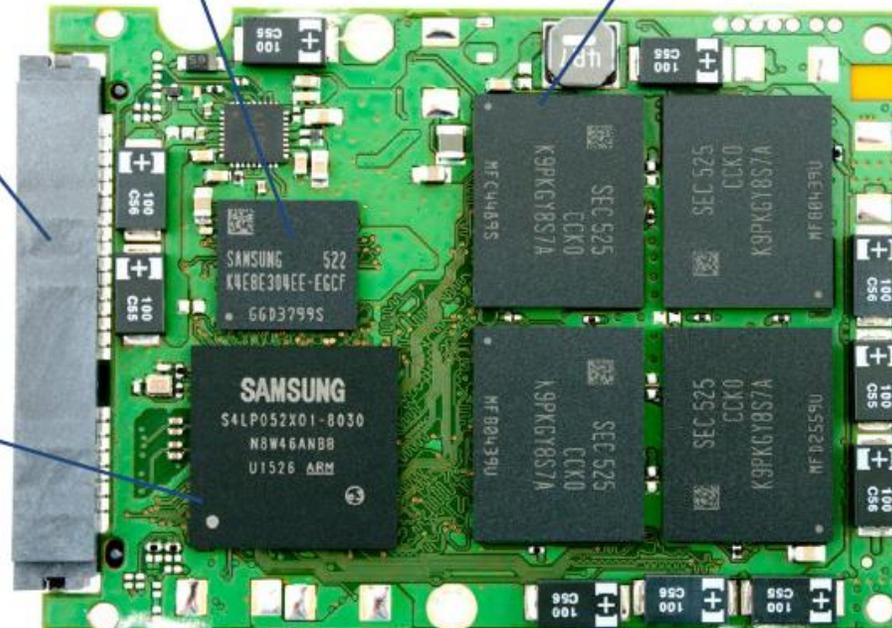


### LED





- All Samsung SSDs are designed, developed and manufactured fully in-house

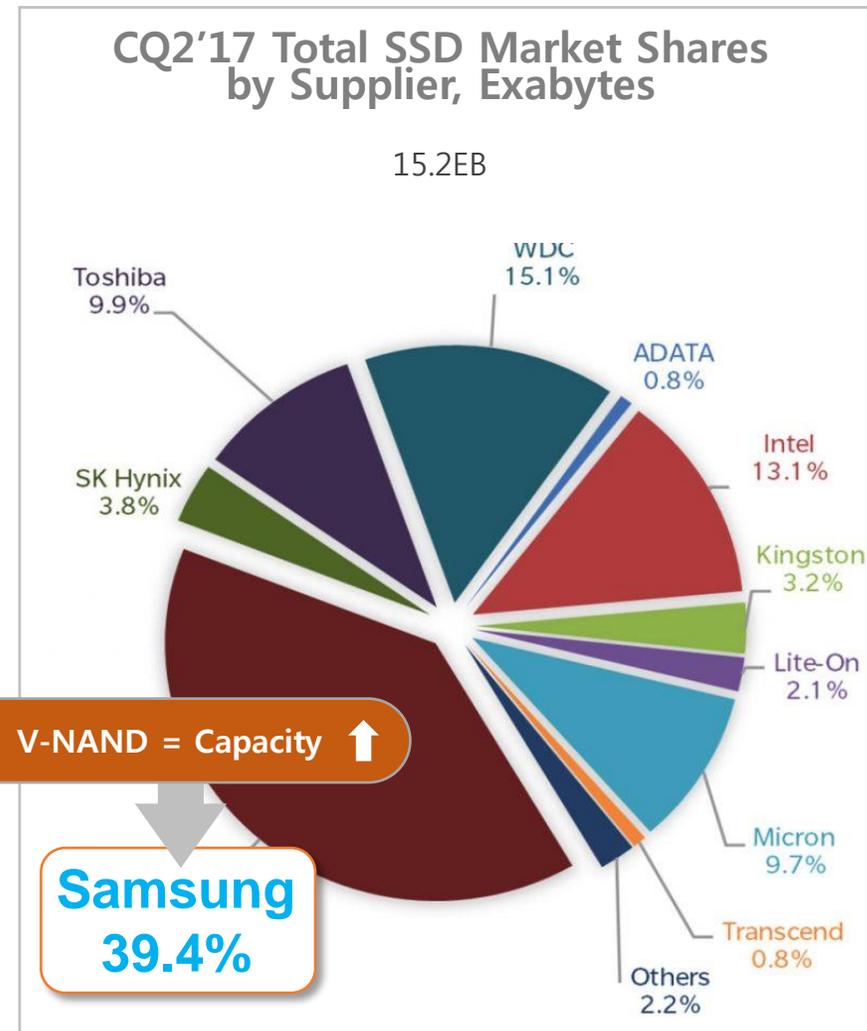
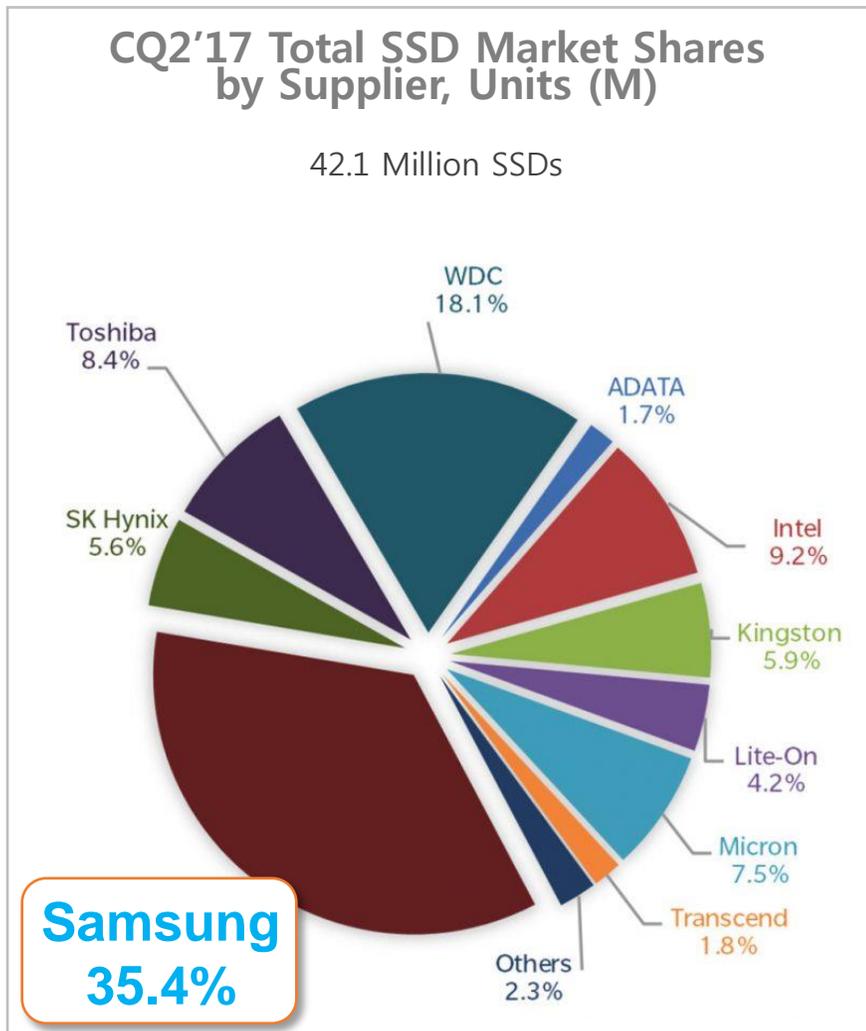


**Samsung DRAM**  
*Best quality*  
*Optimized supply chain*

**NAND Technology**  
*First mover in V-NAND technology*  
*World 1<sup>st</sup> Multi-bit SSDs*

**Interface**  
*World's Largest PCIe SSD supplier*  
2013 1<sup>st</sup> PCIe PC SSD  
2015 1<sup>st</sup> NVMe M.2 SSD  
*World's Biggest SAS (16TB)*

**Controller & Firmware**  
*Leader in Controller Technology*  
2006 1<sup>st</sup> gen. SATA controller → 8<sup>th</sup> gen.  
2010 1<sup>st</sup> gen. SAS controller → 2<sup>nd</sup> gen.  
2012 1<sup>st</sup> gen. NVMe controller → 3<sup>rd</sup> gen.



Source: <https://www.storagenewsletter.com/2017/08/22/ssd-ships-top-42-million-in-2q17-nand-output-up-6-qq-to-41eb/>

# Top performance for cloud computing



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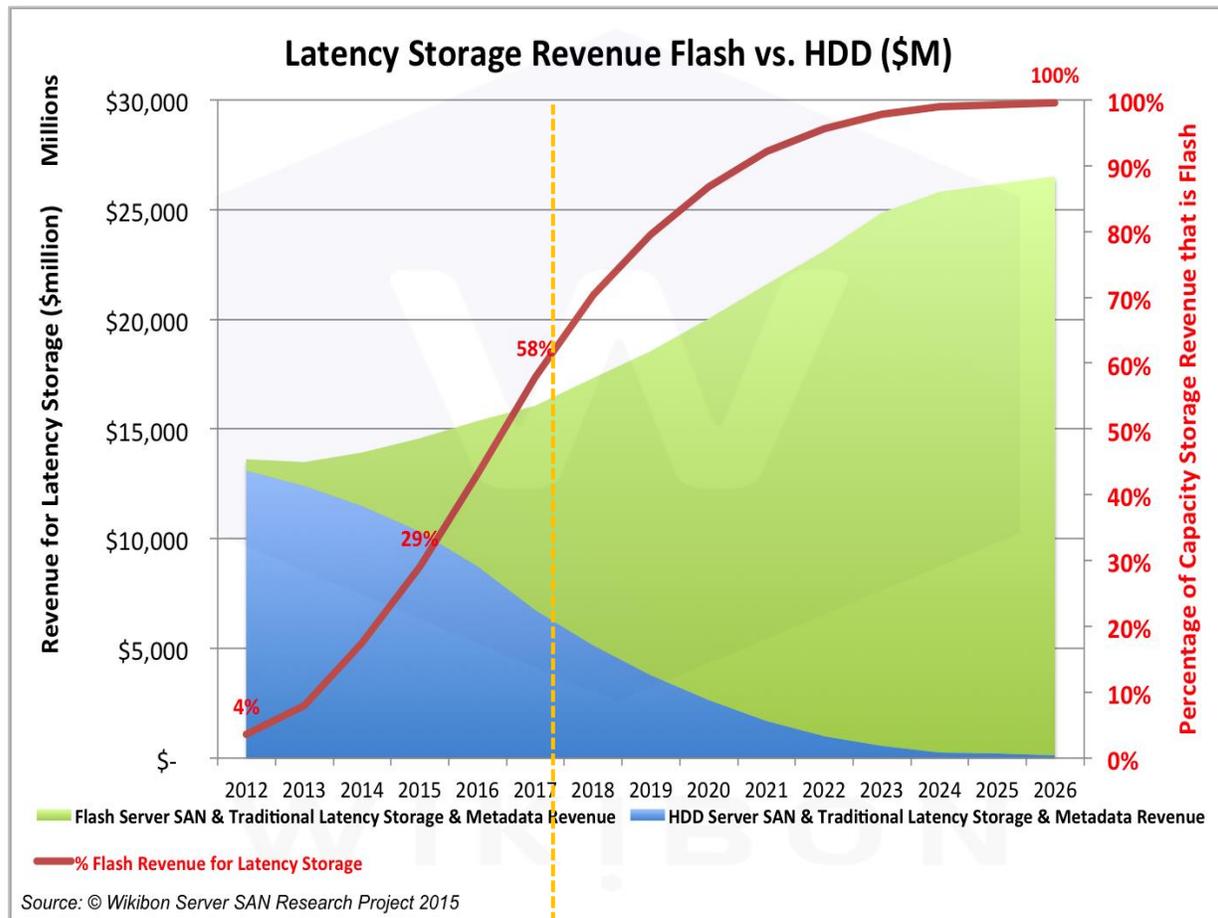
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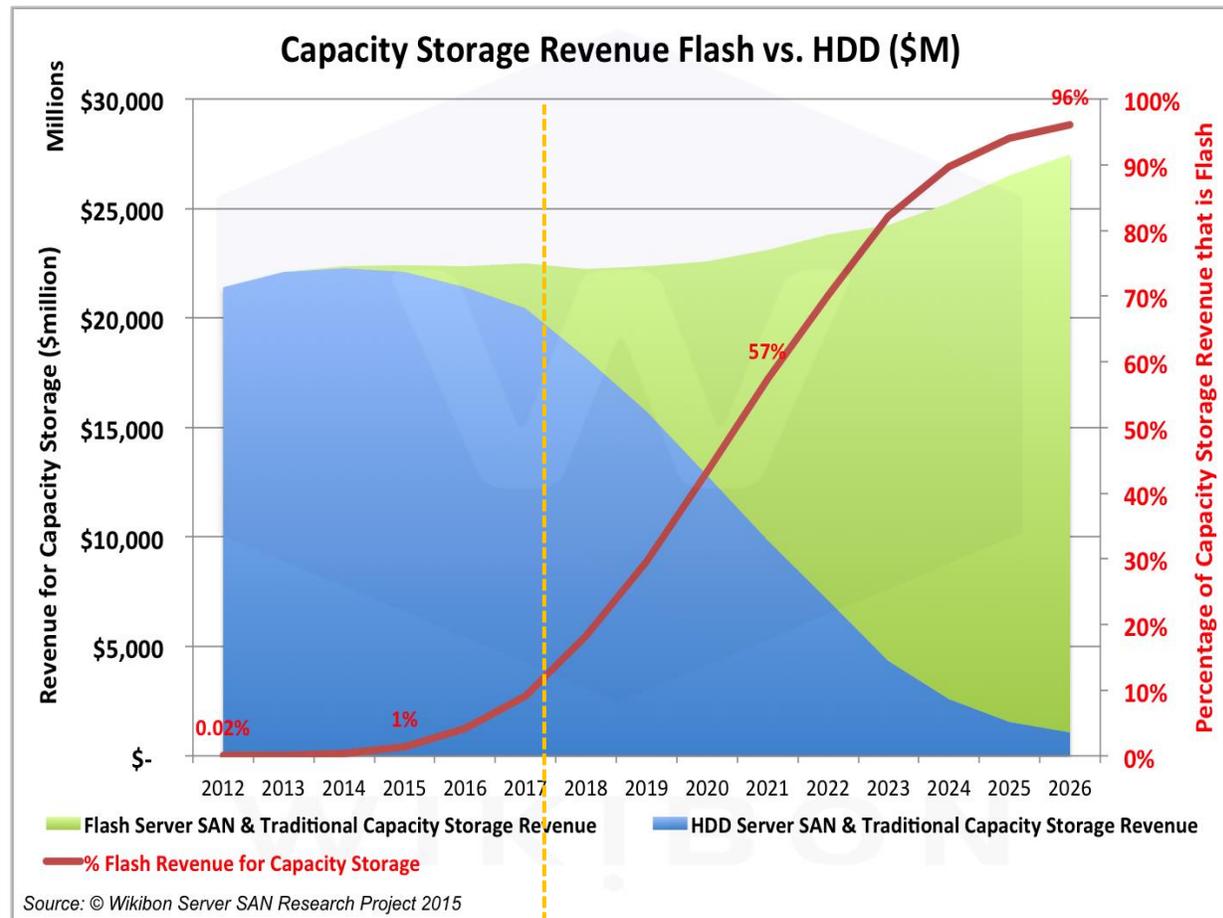
# NAND Flash Technology Update

## ■ SSD has already penetrated latency-critical storage applications and replaced HDD

- Capacity-sensitive applications are just starting to adopt SSD, but will grow rapidly in the next 5 years

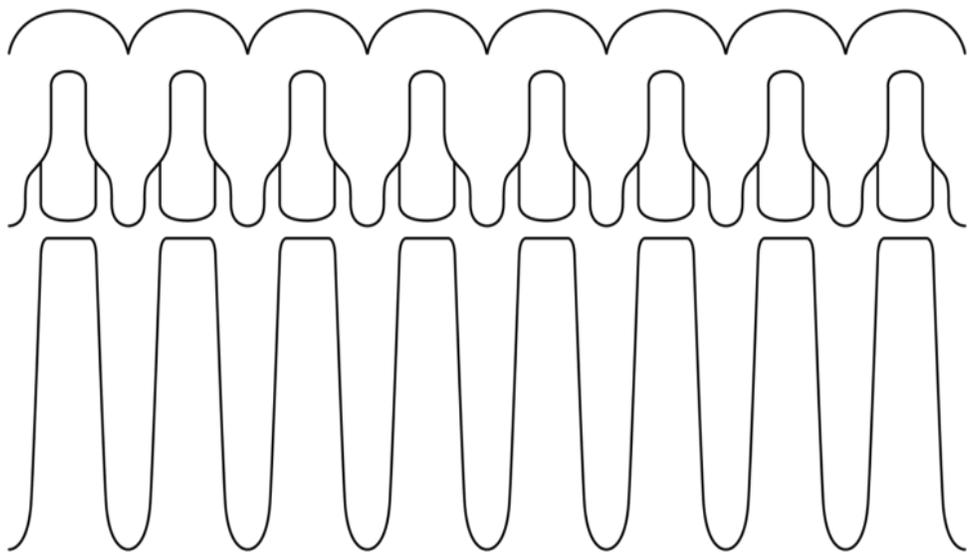


Now

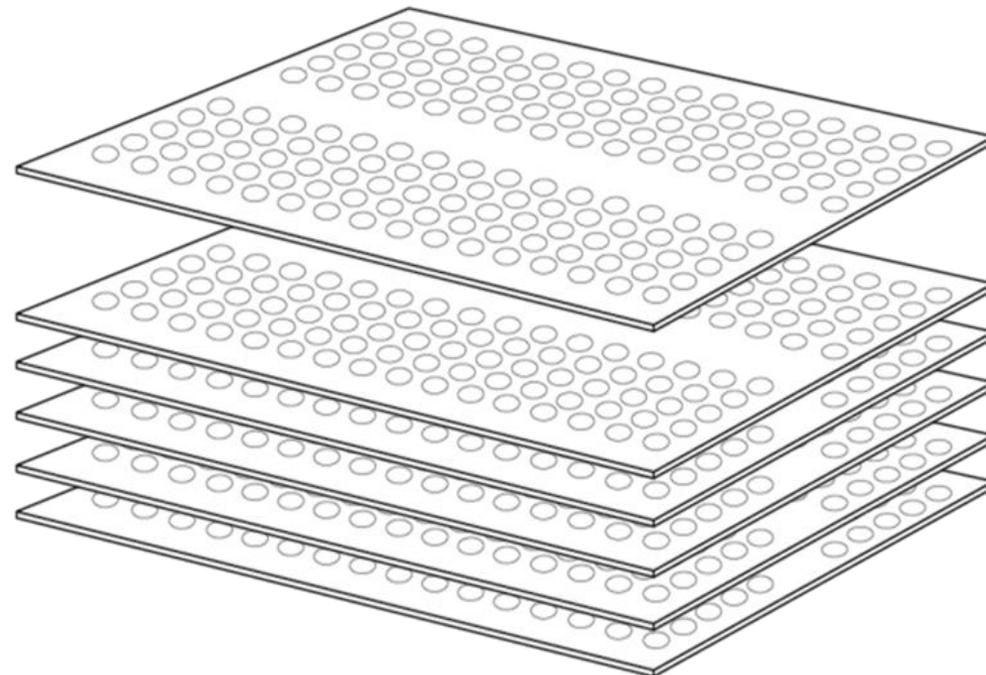


Now

Nanometer

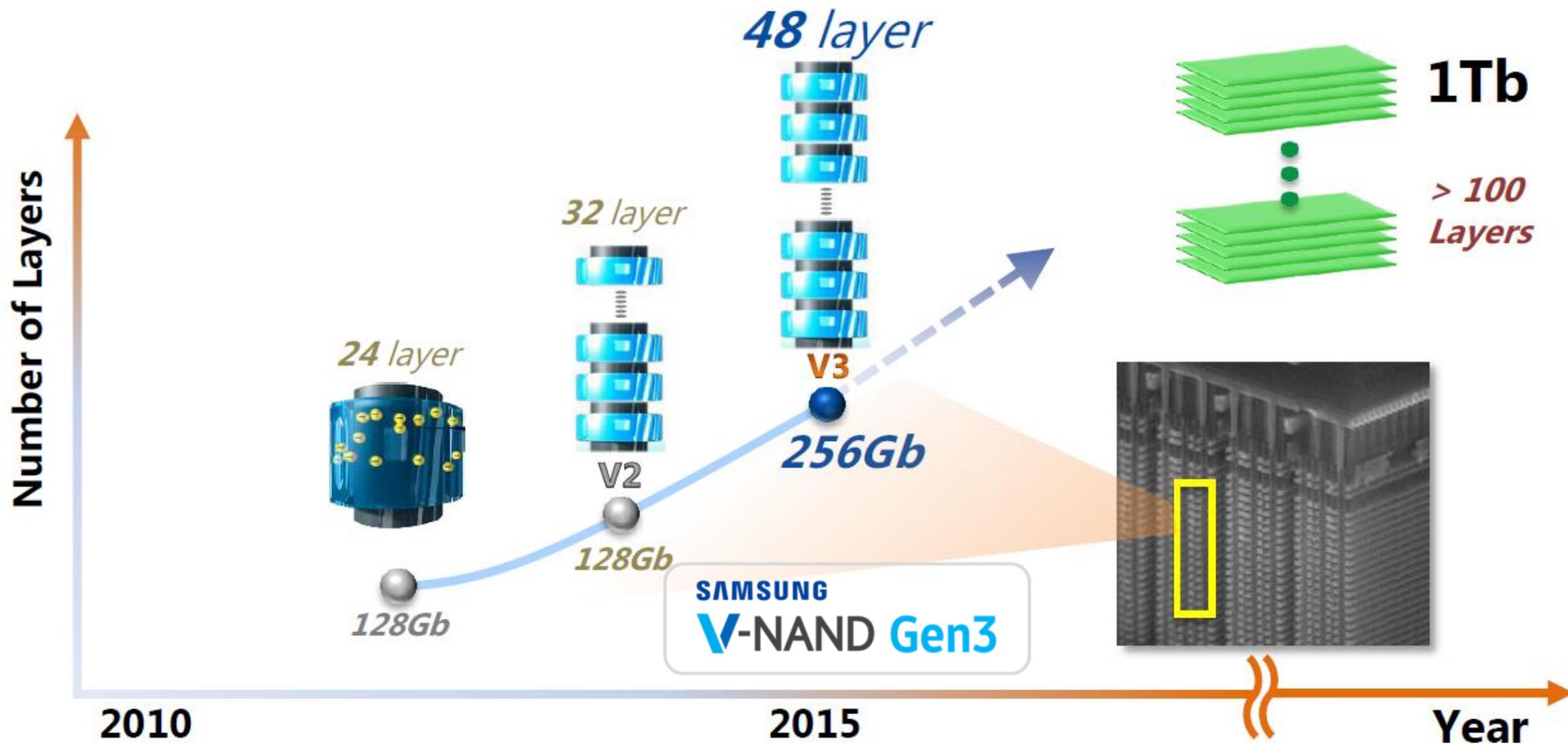


## 2D Planar NAND



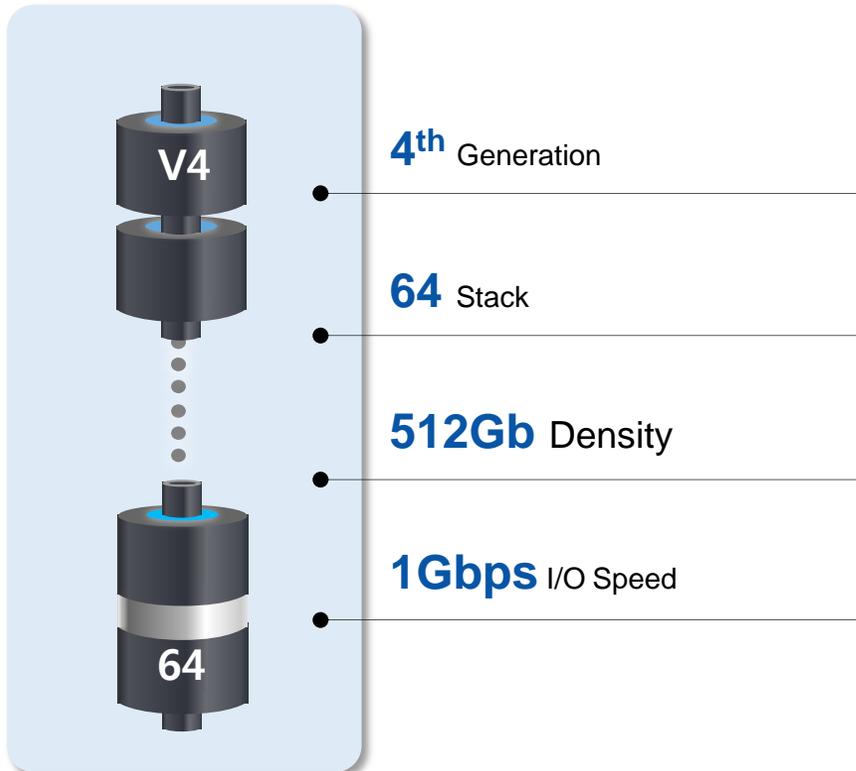
## 3D V-NAND

Similar Footprint, but 4x the Capacity in V3!



## Transition to 4th Generation 3D V-NAND:

- 1TB NVMe BGA SSD for PCs
- 32TB SAS SSD for Enterprise applications



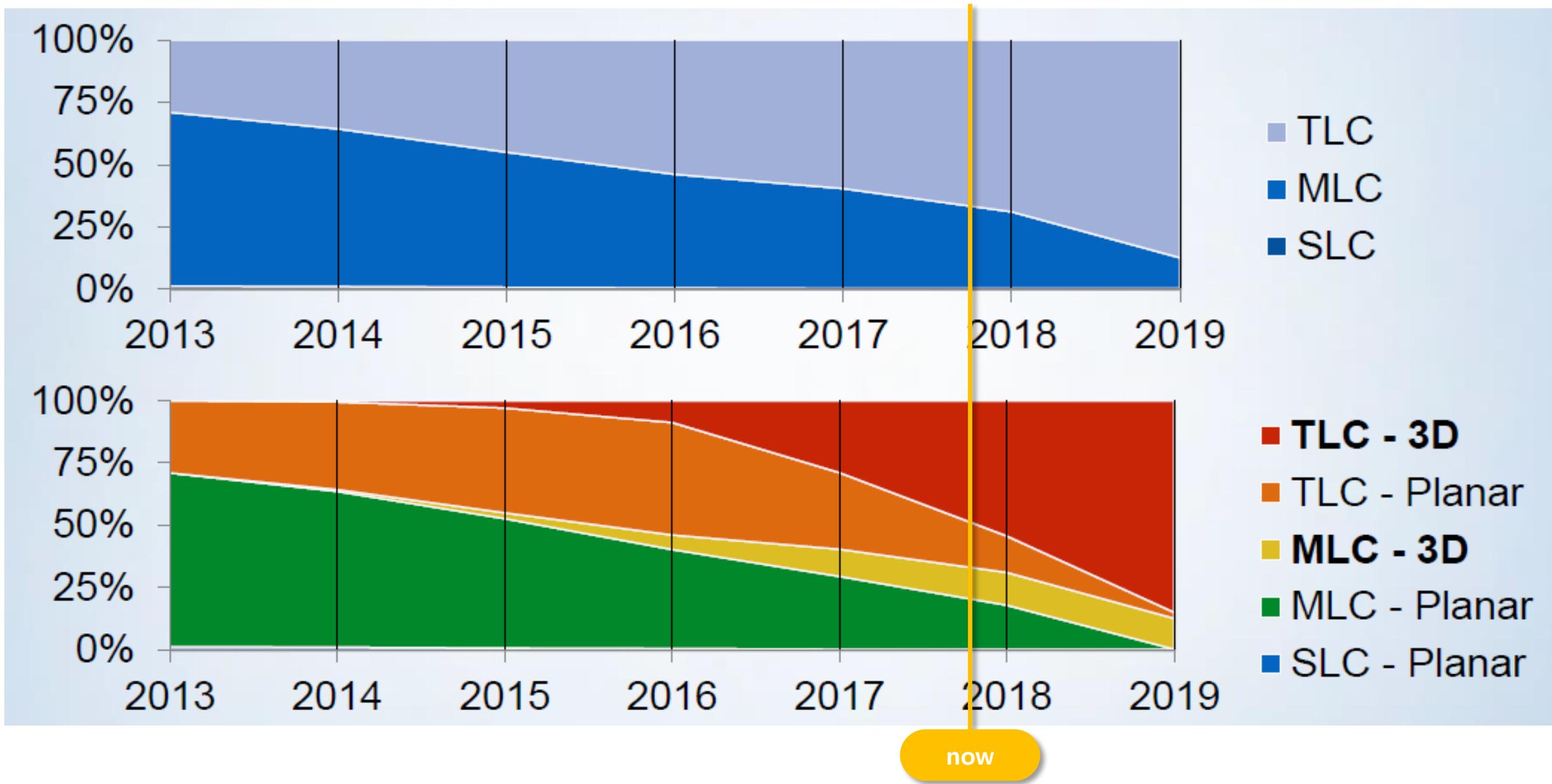
Compared to Gen3:

- +50% More speed
- +30% More productivity
- 50% Less energy



# Market Transition to TLC and 3D NAND

Proprietary



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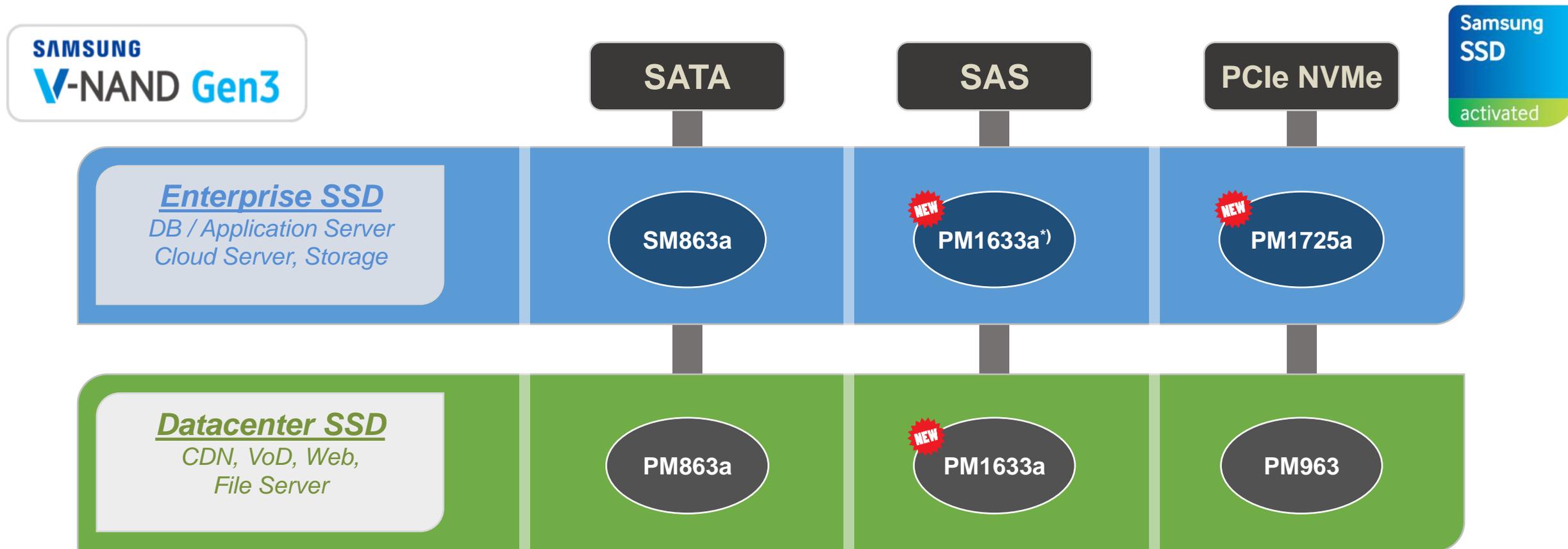
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# Samsung SSD Portfolio

## All Server SSDs are equipped with the latest 3rd Gen 48-layer V-NAND



\*) Higher Over-provisioning

- **High capacity SAS SSD** replaces traditional 10/15Krpm HDDs
- Significantly lower **CAPEX/OPEX** and improved speed/reliability
- Already adopted by **major OEMs** with great success on the market



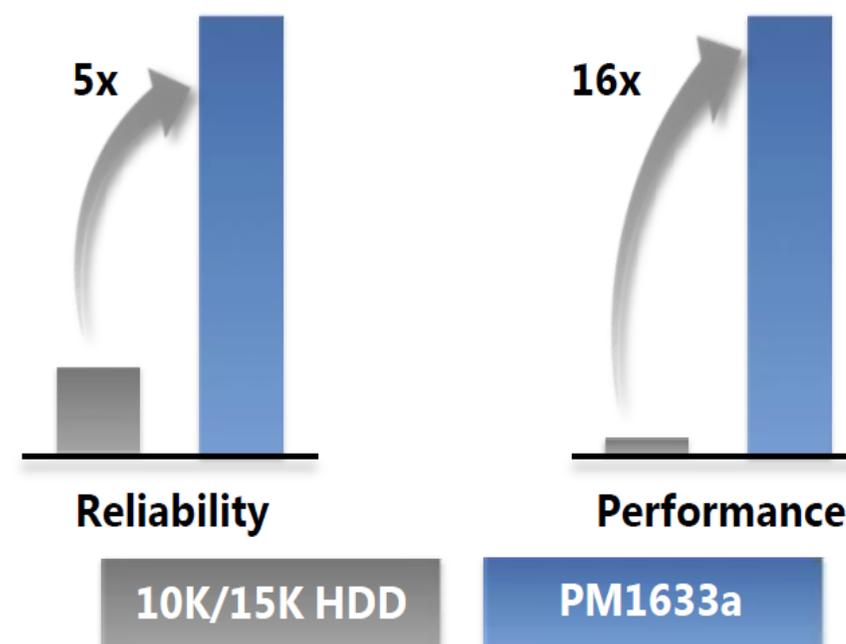
## PM1633a

0.48/0.96/1.92/3.84/7.68/15.36TB



- World 1<sup>st</sup> 3bit NAND SSD (PM1633)
- High Capacity (PM1633a - Up to 15.36TB)
- 12Gb/s SAS

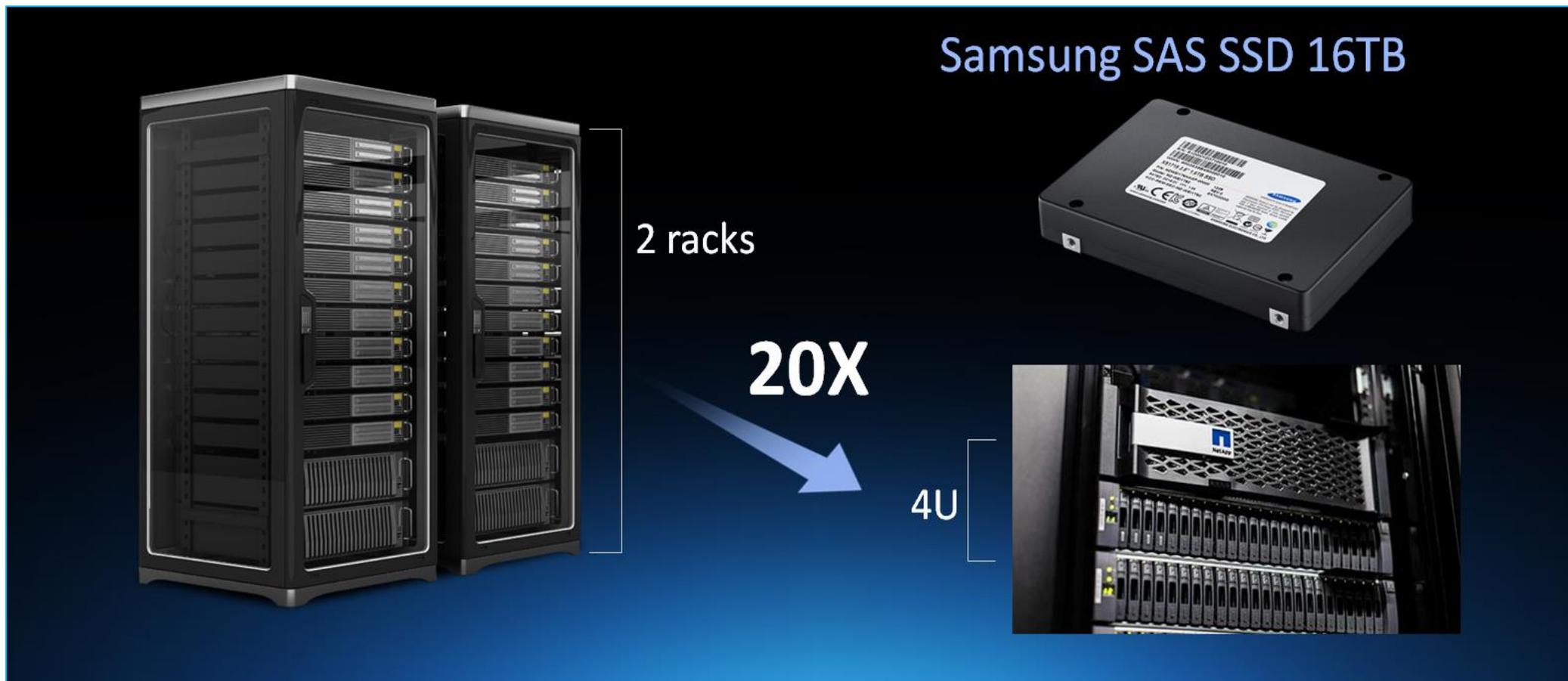
### More than 2x TCO Improvement



- **Massive TCO savings** against traditional 15Krpm HDDs
  - Reduce the number of servers/racks for increased capacity and power efficiency
- **More than 20PB** on a single HP 3Par rack with data reduction



- **NetApp** is **optimizing space** with Samsung 16TB SSD
- **Massive reduction** of footprint within the datacenter
- **Fastest growing** product in NetApp history



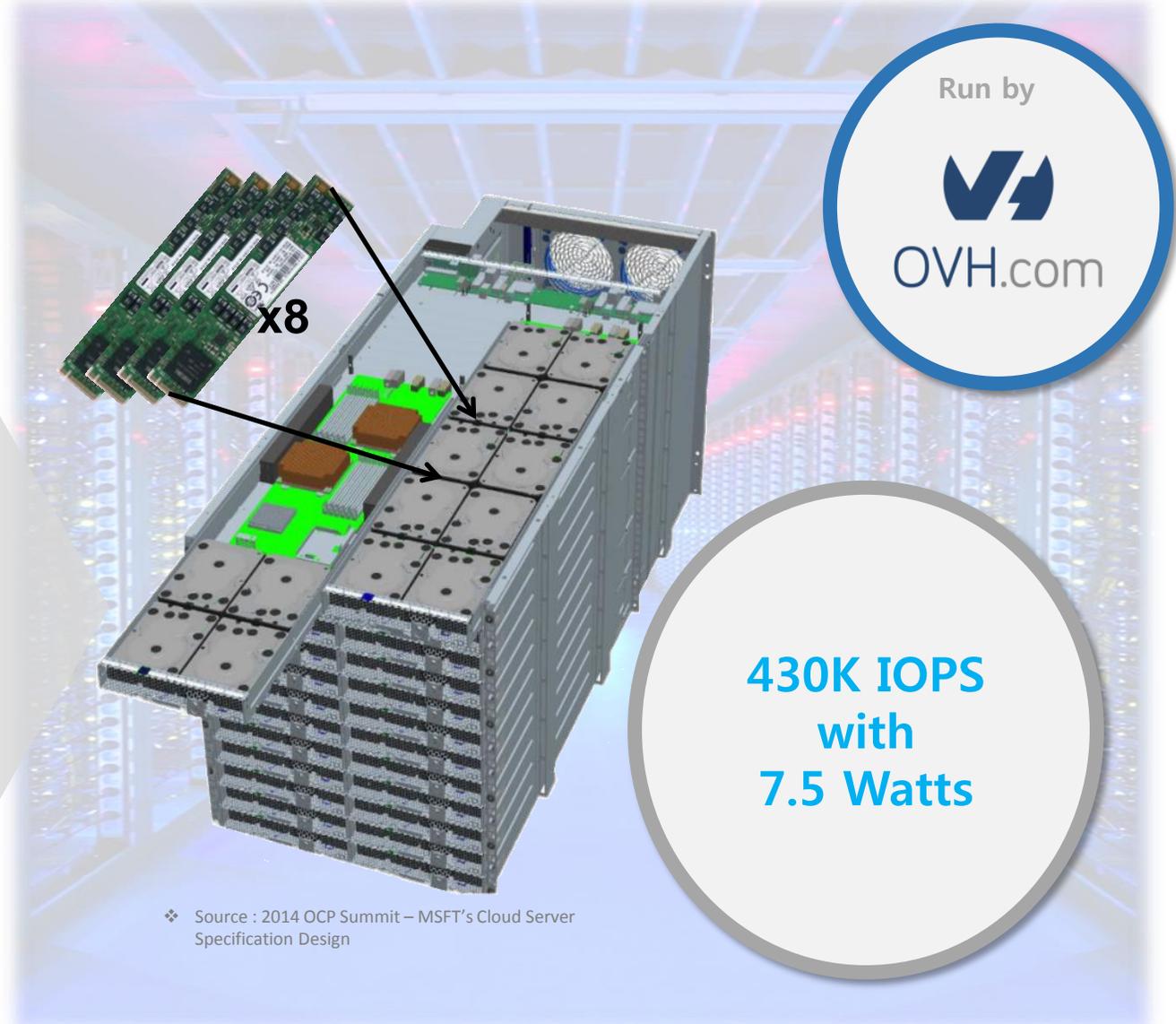
Samsung  
TLC  
V-NAND

## PM963

Up to 1.920GB M.2 || 3.840GB 2.5"



- High Performance
  - PM963- Seq. R/W: 2.0/1.2 GB/s
  - 430K IOPS
  - Power-Loss Protection
- Low Active Power < 7.5W



Run by

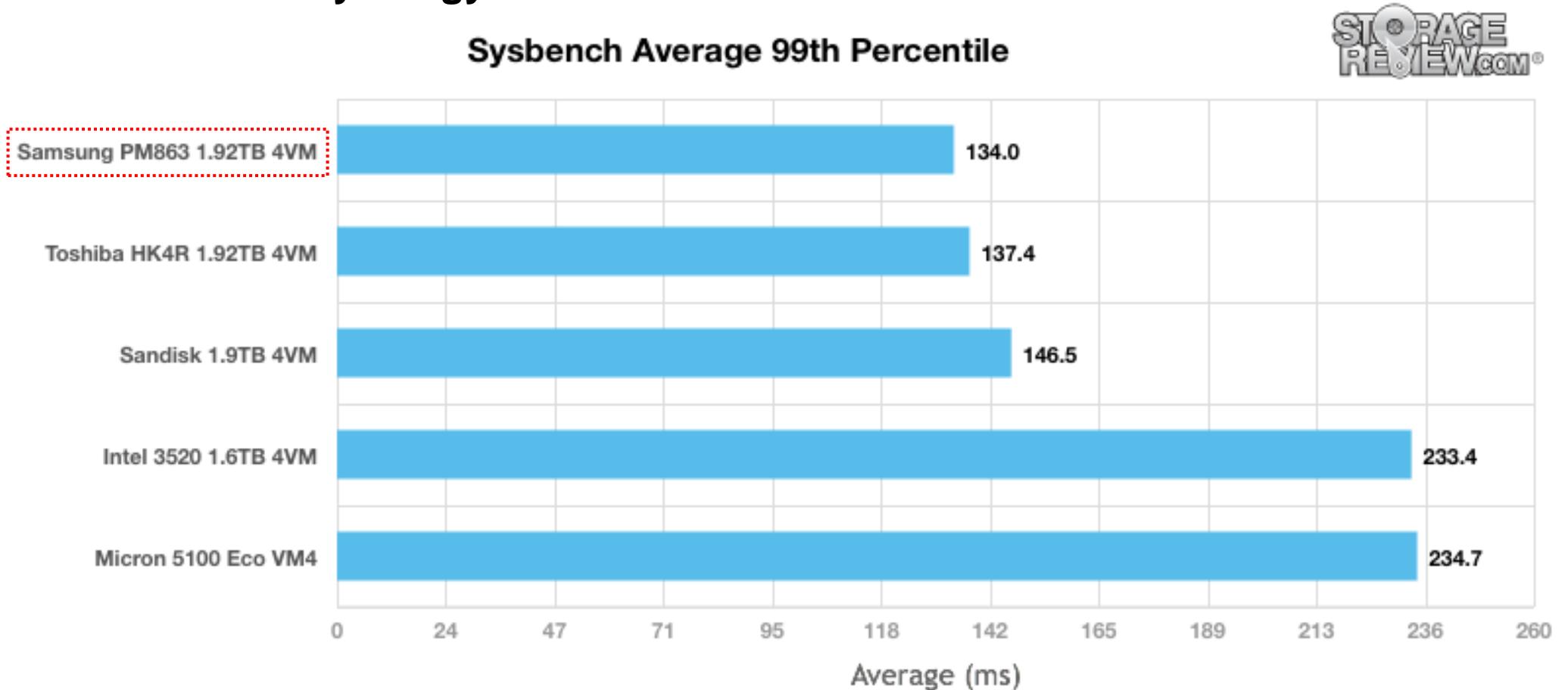


OVH.com

**430K IOPS  
with  
7.5 Watts**

❖ Source : 2014 OCP Summit – MSFT’s Cloud Server Specification Design

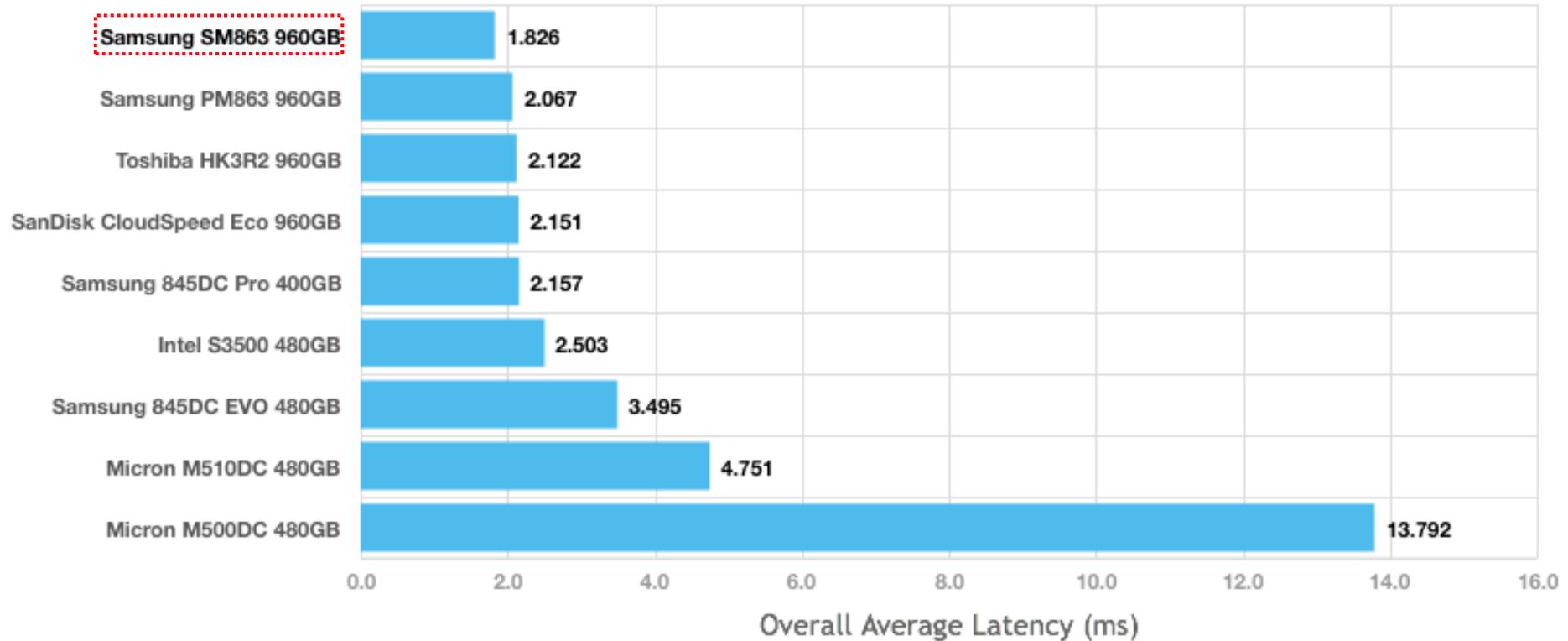
- **TLC V-NAND provides better or equal performance and endurance versus planar MLC**
  - 1 DWPD is suitable for most mainstream applications (VDI, web hosting, boot drive etc)
- **Compatible with most Synology & QNAP devices**



Source: [http://www.storagereview.com/samsung\\_pm863\\_ssd\\_review](http://www.storagereview.com/samsung_pm863_ssd_review)

- **3D MLC enables the best write performance and cost structure**
  - 3.5 DWPD is ideal for caching and other write-intensive workloads
- **Compatible with most Synology & QNAP devices**

StorageReview MarkLogic™ NoSQL Database Benchmark  
Overall Average Latency



Source: [http://www.storagereview.com/samsung\\_sm863\\_ssd\\_review](http://www.storagereview.com/samsung_sm863_ssd_review)

# Flash is Enabling Data as the New Currency

## Capacity



Production Efficiencies  
Must Scale

## Performance



Access, Manipulate,  
& Monetize Data

## Partnership



Technical Collaboration  
for Best-in-Class Product

# THE NEXT CREATION STARTS HERE

Placing **memory** at the forefront of future innovation and creative IT life

